

How well did prior postdoctoral appointments prepare PhDs for their careers? Length, value, and skills of postdoctoral experience

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Introduction

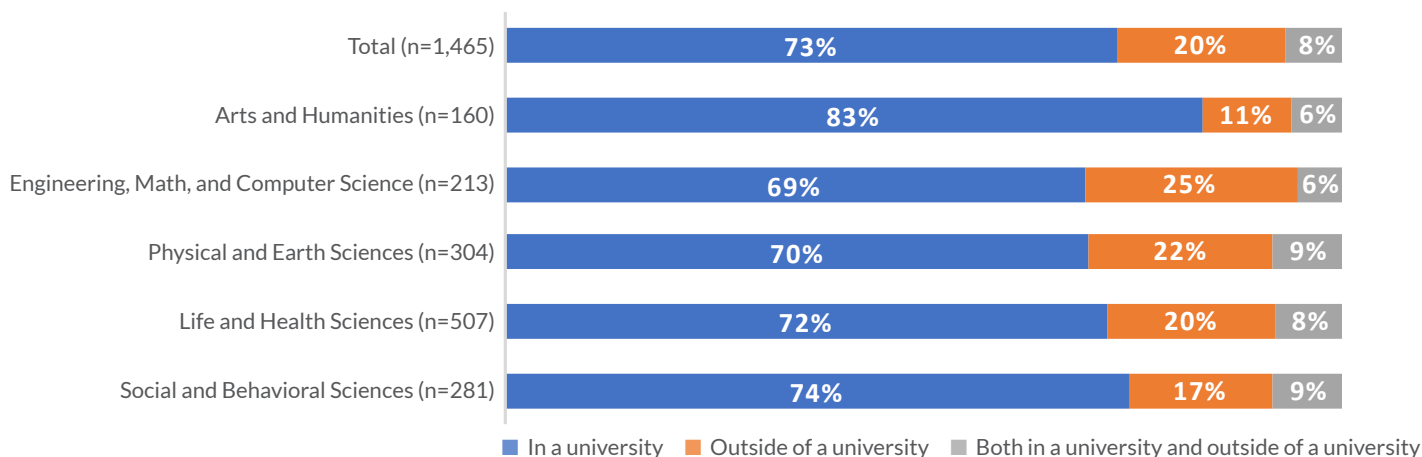
Among recent PhDs recipients who work in faculty positions, many had prior postdoctoral experiences. Although postdoctoral opportunities are intended to provide further professional development and training for PhD recipients, it is unclear how postdoctoral experiences directly align with future job demands and career aspirations (Mitic & Okahana, 2020). Using survey data from the Council of Graduate Schools' (CGS) *PhD Career Pathways* project, this brief provides new insights into the experience and career outcomes of 1,465 PhD holders with postdoctoral training experiences.

Key Findings:

Sector of Postdoctoral Appointments. A large majority (73%) of the survey participants (n=1,465) held their postdoctoral appointments at a university, while some held postdocs at some other type of institution or entity (20%), and a few held postdocs both in a university and outside of a university (8%). This was true across different broad fields of study (Figure 1).

Figure 1. Distribution of Former Postdoctoral Training Position(s) by Sector and Field

Majority of postdoctoral appointments were *in a university*.

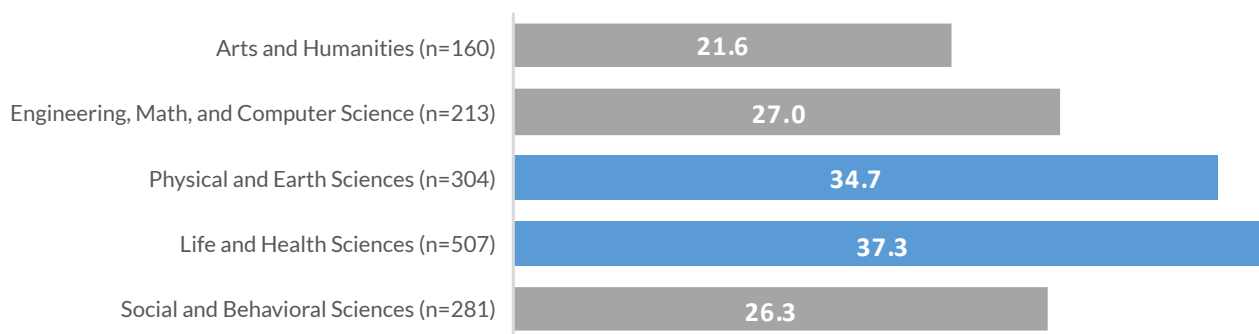




Length of Postdoctoral Appointments. The length of the postdoctoral appointment varied by broad field of study. The average length of postdoctoral appointments was longer in Life and Health Sciences (37.3 months) and Physical and Earth Sciences (34.7 months), compared to Engineering, Math, and Computer Science (27.0 months), Social and Behavioral Sciences (26.3 months), and Arts and Humanities (21.6 months) (Figure 2).

Figure 2. Length (month) of Postdoctoral Appointments by Field

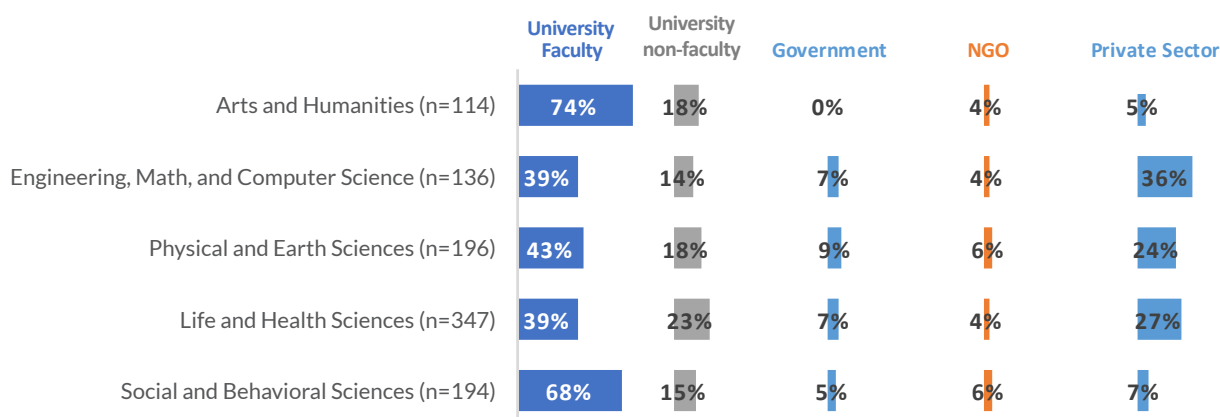
Average length of postdoctoral appointment was longer in the STEM fields.



Data Source: Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement, Fall 2020 Follow-up Alumni Survey.*

Diverse Career Pathways. Not all former postdocs at universities subsequently went on to faculty positions. For postdocs in STEM fields, a large percentage were working in industry at the time of participation in this study: 36% of postdocs in Engineering, Math, and Computer Science and 27% in Life and Health Sciences worked in the private sector. In contrast, 74% of former Arts and Humanities postdocs at universities went on to become faculty members. Combined with those who worked as administrators and staff at the time of survey participation, 92% of Arts and Humanities who had held university postdocs later went on to jobs in the postsecondary sector. A small number of Arts and Humanities postdocs were employed in the non-profit and private sectors (4% and 5%, respectively) (Figure 3). In contrast, those who held non-university postdoctoral appointments were more likely to go on to jobs in the non-academic sector (Figure 4).

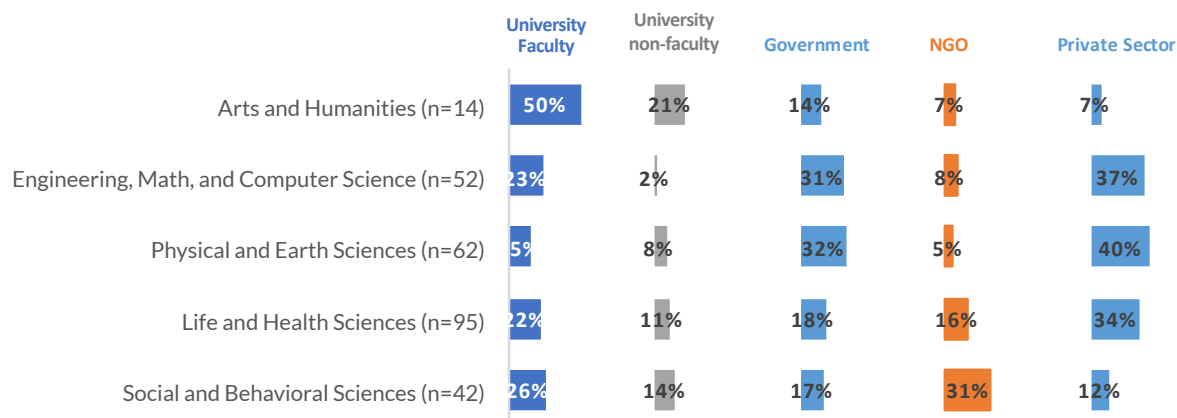
Figure 3. Distribution of Former Academic Postdocs by Employment Sector



Data Source: Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement, Fall 2020 Follow-up Alumni Survey.*



Figure 4. Distribution of Former Non-Academic Postdocs by Employment Sector



Data Source: Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement, Fall 2020 Follow-up Alumni Survey*.

The Perceived Value of a Postdoctoral Experience. When asked to rate the value of their postdocs in securing subsequent employment on a 5-point scale, from not valuable at all to extremely valuable, former postdoctoral associates recorded favorable views on how their experience helped them securing subsequent employment. Those with doctorates in Social and Behavioral Sciences had the most favorable views, with the average score of 4.0 out of 5 (Figure 5).

Figure 5. The Perceived Value of Postdocs in Securing Subsequent Employment by Field

Average value of postdoctoral appointment was *higher in Social and Behavioral Sciences*.



Data Source: Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement, Fall 2020 Follow-up Alumni Survey*.



Preparation in Specific Skills. Participants were asked how well their graduate programs prepared them in specific knowledge and attributes in the baseline surveys and the same questions were asked about their postdoc experiences in the follow-up survey. To understand how postdocs experiences added to career preparation compared to graduate study, we compared the mean scores of skills preparedness between graduate programs and postdoc experience for participants who participated in both the baseline and follow-up survey. Across the board, former postdocs reported higher marks for professional development opportunities during their doctoral studies than in their postdoctoral experiences. Moreover, respondents across all fields reported less postdoctoral preparation in specific skills and attributes such as grant writing, networking, and awareness of cultural values and biases and using culturally appropriate interpersonal skills (Table 1).

Table 1. Mean Responding to Survey Item, “How well did (are) your graduate programs or postdoc experiences prepare (preparing) you in the following knowledge, attributes, and behaviors?” (5-point scale: 1=Poorly to 5=extremely well) by Selected Fields.

	Arts and Humanities		Engineering, Math, and Computer Science		Physical and Earth Sciences		Life and Health Sciences		Social and Behavioral Sciences	
	Graduate Program	Postdoc Experiences	Graduate Program	Postdoc Experiences	Graduate Program	Postdoc Experiences	Graduate Program	Postdoc Experiences	Graduate Program	Postdoc Experiences
Applying research methodologies appropriately	4.1	2.8	4.3	3.6	4.4	3.8	4.4	3.7	4.3	3.4
Awareness of cultural biases	3.7	2.4	2.8	2.4	2.7	2.2	2.8	2.3	3.4	2.5
Communicating ideas clearly and persuasively in writing	4.0	2.9	4.0	3.4	4.0	3.5	4.0	3.3	4.1	3.4
Communicating ideas clearly to a variety of audiences	3.4	2.9	3.8	3.2	3.5	2.9	3.5	2.9	3.4	3.0
Communicating ideas clearly when speaking in small groups	3.9	3.1	4.0	3.4	3.8	3.4	4.0	3.3	3.9	3.2
Conducting research in an ethical manner	3.9	2.6	4.0	3.6	4.0	3.5	4.0	3.5	4.1	3.2
Critically analyzing and evaluating findings	4.4	2.8	4.3	3.7	4.4	3.9	4.5	3.8	4.5	3.6
Demonstrating understanding of your subject area	4.2	3.0	4.2	3.5	4.2	3.7	4.3	3.6	4.4	3.5
Developing new ideas, processes, or products	3.8	2.7	3.8	3.4	3.8	3.5	3.8	3.3	3.7	3.2
Grant writing	2.7	2.0	2.5	2.4	2.7	2.6	3.1	2.7	2.9	2.6
Influencing others and encouraging their contribution	3.4	2.6	3.5	3.0	3.3	3.1	3.3	2.9	3.4	2.8
Using culturally appropriate interpersonal skills	3.4	2.7	3.2	2.7	2.9	2.7	3.0	2.5	3.4	2.6
Valuing others’ worldviews	3.9	2.9	3.3	3.0	3.1	3.0	3.2	2.8	3.7	3.1
Working constructively with colleagues	3.5	3.1	3.8	3.6	3.8	3.6	3.8	3.4	3.8	3.5
Publishing books, journal articles, etc.	N/A	2.8	N/A	3.3	N/A	3.3	N/A	3.1	N/A	3.2
Presenting at conferences	N/A	3.1	N/A	3.4	N/A	3.5	N/A	3.1	N/A	3.3
Networking	N/A	2.8	N/A	2.9	N/A	2.8	N/A	2.6	N/A	2.9

Note: Means are reported based on data collected from only those responded to both the baseline and follow-up surveys. N/A = No data was collected in the baseline surveys.

Data Source: Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement*, Fall 2020 Follow-up Alumni Survey, Fall 2017-Fall 2019 Alumni Surveys.



Takeaway Points

- The findings show that postdoctoral positions, including academic postdocs, are pathways to diverse sectors of employment. Overall, postdoctoral associates value their postdoc in securing subsequent employment. This suggests that postdoctoral training, like doctoral education itself, needs to focus on preparing for diverse career paths. Given that PhDs are changing jobs within and across sectors in their early careers and even into mid-career (Okahana, 2019), it is important to prepare postdocs to navigate different job opportunities throughout their career as a whole. Postdocs are likely to benefit when their supervisors, especially at universities, thinking more broadly about career preparation and provide access to appropriate training experiences.
- Perceptions of the value of the postdoc experience in preparing for various work-related skills varied by field of study. However, across all skill sets, postdoctoral preparation is evaluated as less effective than professional development and other experiences in respondents' doctoral programs. This may suggest opportunities for graduate schools and programs to work more closely in extending and enhancing professional development opportunities to postdoctoral associates. It would also be useful for funders to continue to require professional development for postdocs employed on grants.
- Former postdoctoral associates in Engineering, Math, and Computer Science, Physical and Earth Sciences, and Life and Health Sciences reported feeling well prepared for research-related skills like research methodologies, critical analysis, and demonstrating a theoretical and practical understanding of their subject area. While postdocs in Arts and Humanities reported feeling less well prepared in these skills, this may be explained by the wording of the item about research methodologies, which is less likely to resonate with their experience or disciplinary paradigms.
- Arts and Humanities postdocs felt less well prepared for publishing books, journal articles, and presenting at conferences and networking compared to postdocs in the STEM fields. This may be explained by variations in the structure of research and scholarship across different broad fields. Whereas STEM postdocs typically gain access to new team-based research opportunities through their postdocs—and therefore new opportunities for collaboration in the publication process—postdocs in the Arts and Humanities often devote their time turning a single-authored dissertation into a book or articles. Postdocs in the Humanities may therefore find themselves continuing solitary efforts to publish without the benefit of the support structures they had as graduate students.
- The preparation of postdocs in cultural competencies such as valuing worldviews others than their own was rated relatively low among types of postdoctoral training. Across fields, postdocs felt less prepared in cultural competencies than in other skills, a finding similar to findings in baseline surveys. These findings show that it is important for institutions to provide postdoctoral trainees training in this area.

Conversation Starters for Postdoctoral Training

As you are implementing a plan or programs to support postdoctoral associates at your institution, here are some questions to consider as you start the conversations with your campus colleagues (e.g. graduate school staff, college deans, graduate program directors, postdoc office or supervisors, etc.):

- What competencies and skills do your postdoctoral associates need as they enter the workforce?
- How can postdoctoral training be expanded to better align with employer expectations, particularly employers in sectors beyond the academy?
- What kind of professional development opportunities does your institution offer to postdoctoral associates with diverse career goals?
- What is the mentorship experience of postdocs at your institutions? How can your institution provide mentorship to postdoctoral associates that would be valuable for preparing them for their future careers?
- What are the teaching and mentoring responsibilities of postdocs at your institution? What is the distribution of their teaching and research workload? Should they have opportunities to do so given their career interests?



Additional Resources

National Postdoctoral Association (NPA): Since 2003, the National Postdoctoral Association has been the leading professional organization tasked with improving the postdoctoral experience. The NPA advocates for postdoctoral associates in academic, industry, nonprofit, and government sectors. Learn more about the [National Postdoctoral Association](#).

Preparing Future Faculty (PFF): Launched in 1993 as a partnership between CGS and the Association of American Colleges and Universities, the PFF initiative is a national movement to transform the way aspiring faculty members are prepared for their careers.

About the Data Source

The CGS PhD Career Pathways Project Alumni Follow-Up Survey was distributed in summer 2020 to doctoral degree recipients that were three, eight, or fifteen years out of their PhD in selected programs at participating institutions when they previously completed a baseline survey between 2017-2019. This brief is based upon this aggregated data set that includes 1,465 respondents from 58 institutions who formerly held the position of “Postdoctoral Associate.”

References

- Mitic, R. R., & Okahana, H. (2020). Closing gaps in our knowledge of PhD career pathways: How do biological and life sciences PhD holders transition into the workforce? Council of Graduate Schools.
- Okahana, H. (2019). Closing gaps in our knowledge of PhD career pathways: Job changes of PhD graduates after earning their degree. Council of Graduate Schools.

The CGS PhD Career Pathways Coalition

CGS PhD Career Pathways is a coalition of 75 doctoral institutions working to better understand and support PhD careers across all broad fields of study. Over the course of the project, universities will continue collecting data from current PhD students and alumni using surveys that were developed by CGS in consultation with senior university leaders, funding agencies, disciplinary societies, researchers, and PhD students and alumni. The resulting data are allowing universities to analyze PhD career preferences and outcomes at the program level and help faculty and university leaders strengthen career services, professional development opportunities, and mentoring.

About CGS

For over 60 years, the Council of Graduate Schools has been the only national organization dedicated solely to advancing master’s and doctoral education and research. CGS members award 86.9% of all U.S. doctoral degrees and 59.8% of all U.S. master’s degrees. CGS accomplishes its mission through advocacy, the development and dissemination of best practices, and innovative research.

The brief was prepared by Enyu Zhou, Senior Analyst, Council of Graduate Schools. E.Z. analyzed the data and prepared the initial draft. Hironao Okahana directed the underlying research activities and supervised the analysis for this work. Radomir Ray Mitic contributed to the data collection and preparation of the follow-up survey. Christian P.L. West, Janet Gao, and E.Z. conducted data collection and preparation of the baseline surveys. Suzanne T. Ortega, Hironao Okahana, Julia Kent, and Radomir Ray Mitic reviewed and commented on earlier drafts. Matthew Linton provided production support. This brief is based on work supported by grants from The Andrew W. Mellon Foundation (grant numbers 21500103, 31600612 and 1809-06155) and the National Science Foundation (grant numbers 1661272 and 2000750). Any opinions, findings, and conclusions or recommendations expressed in this brief do not necessarily reflect the views of the funders.